Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385

Dominion

APR 26 2004

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Serial No.	04-223
MPS Lic/RWM	R0
Docket No.	50-336
License No.	DPR-65

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION, UNIT 2
LICENSEE EVENT REPORT 2004-001-00
MANUAL REACTOR TRIP ON LOW STEAM GENERATOR LEVEL RESULTING FROM A FEEDWATER PUMP SPURIOUS RELAY OPERATION

This letter forwards Licensee Event Report (LER) 2004-001-00, documenting an event that occurred at Millstone Power Station, Unit 2, on March 6, 2004. This LER is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A), as an event or condition that resulted in a manual actuation of a reactor protection system.

If you have any questions or require additional information, please contact Mr. David W. Dodson at (860) 447-1791, extension 2346.

Very truly yours,

J. Alan Price
Site Vice President - Millstone

IE22

Attachments: (1)

Commitments made in this letter: None.

cc: U.S. Nuclear Regulatory Commission
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Mr. S. M. Schneider
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Attachment 1

Millstone Power Station, Unit No. 2

LER 2004-001-00

Dominion Nuclear Connecticut, Inc.

NRC FORM 366 (7-2001)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)		Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Millstone Power Station - Unit 2	05000336	1 OF 3

TITLE (4)
Manual Reactor Trip on Low Steam Generator Level Resulting From a Feedwater Pump Spurious Relay Operation

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER 05000
03	06	2004	2004	001	00	04	26	2004	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)							
POWER LEVEL (10)	100		20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
			20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
			20.2203(a)(1)		50.36(c)(1)(i)(A)	x	50.73(a)(2)(iv)(A)		73.71(a)(4)
			20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
			20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER
			20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
			20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
			20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
			20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
David W. Dodson, Supervisor Nuclear Station Licensing	860-447-1791

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
☐ YES (If yes, complete EXPECTED SUBMISSION DATE).	☒ NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On March 6, 2004, at approximately 0050 with the unit in Mode 1 at 100 percent power, and with steam generator (SG) level approaching about 55 percent, operators initiated a manual reactor trip in anticipation of the low SG water level auto trip setpoint. The decreasing SG water level was due to a reduction in feedwater from the loss of the 'B' steam generator feedwater (SGFW) pump. The 'B' SGFW pump had tripped unexpectedly causing lowering SG water levels.

This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in manual or automatic actuation of any of the systems listed in 50.73(a)(2)(iv)(B). This includes Reactor Protection System actuation (RPS) and Auxiliary Feedwater System initiation (AFW).

The apparent cause of the trip was agitation of a relay in the feedwater pump control system. This perturbed the relay's signal to the digital control system (MicroNet) sufficiently for it to sense a low pressure condition and initiate a trip of the feedwater pump, even though a low pressure condition did not exist.

As a result of the Event Investigation Team (EIT) findings in response to the immediate issue of relay contact sensitivity, a relay's operation in the speed control circuit for the SGFW pumps was changed from an energized closed to an energized open configuration with the associated software changes. This reduces the HGA relay sensitivity to agitation and will avert additional SGFW pump trips.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

1. Event Description

On March 6, 2004, at approximately 0050 with the unit in Mode 1 at 100 percent power, and with steam generator (SG) level approaching about 55 percent, operators initiated a manual reactor trip in anticipation of the low SG water level auto trip setpoint. The decreasing SG water level was due to a reduction in feedwater [SJ] from the loss of the 'B' steam generator feedwater (SGFW) pump. The 'B' SGFW pump had tripped unexpectedly causing lowering SG water levels.

All control rods inserted into the core and all electrical busses transferred properly following the trip. Post trip procedures were followed and the plant response was as expected. When the main turbine reached approximately 1200 RPM, a Turbine High-High vibration alarm was received. The annunciator response procedure was carried out for vibration levels greater than 15 mils. Both Main Steam Isolation Valves (MSIVs) were closed and condenser vacuum was broken to slow the main turbine. Auxiliary Feedwater (AFW) [BA] initiated as expected, on a low steam generator level following the trip from 100 percent power. Operators established decay heat removal capability using the AFW system and the atmospheric steam dump valves.

During and after the plant trip there was no challenge to the mitigating systems. Following the manual reactor trip, the standard post trip procedure actions were carried out. The plant was monitored and the crew transitioned to the post trip recovery procedure. Safety function status checks were performed successfully and, with the plant stable in MODE 3 (HOT STANDBY) at approximately 0310, the crew transitioned to the normal operation procedure set.

This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in manual or automatic actuation of any of the systems listed in 50.73(a)(2)(iv)(B). This includes Reactor Protection System actuation (RPS) and Auxiliary Feedwater System initiation (AFW). A non-emergency notification was made on March 6, 2004, to the NRC Operations Center (Event Number 40570) in accordance with 10 CFR 50.72(b)(3)(iv)(A) and 50.72(b)(2)(iv)(B).

2. Cause

The SGFW pumps were originally designed to operate in both automatic and manual operation utilizing a pneumatic positioner, although the automatic function was historically not utilized. In April 2002, a design change was implemented to replace the mechanical-hydraulic main feedwater pump turbine control system [JK]. The design change replaced the existing feedwater pump speed control system with a Woodward Governor digital control system (MicroNet system). The system uses a digital controller and a hydraulic actuator to control the main feedwater pumps.

The apparent cause of the trip was agitation of a relay in the feedwater pump control system. This perturbed the relay's signal to the MicroNet sufficiently for the MicroNet to sense a low pressure condition and initiate a trip of the feedwater pump, even though a low pressure condition did not exist. The resulting 'B' SGFW pump trip required the operators to initiate a manual reactor trip on low SG level.

A root cause of this event was a lack of experience, both on site and through industry review, relating to problems associated with the interfacing of a control grade electromagnetic device, (specifically a General Electric HGA type relay), with a state of the art digital microprocessor. This led to a decision to install a configuration in which very slight agitation of this control relay or its cabinet could perturb the signal to the MicroNet processor sufficiently for the microprocessor to generate a trip signal to the SGFW pump. This type of an electrical relay has been noted for its sensitivity to mechanical vibration and soft contact closure.

3. Assessment of Safety Consequences

The purpose of the steam generator feedwater (SGFW) system is to provide water to the SGs for the transfer of thermal energy from the primary side of the SGs to the secondary side. After the trip, the Main Feedwater (MFW) function of the SGFW system became unavailable for decay heat removal. This function is credited in the PRA, but is not risk significant. As a result, the risk associated with this reactor trip was calculated to be slightly higher than the risk associated with the general plant transient, in which the MFW remains available. During and after the plant trip there was no challenge to the mitigating systems, and the required safety equipment was operable. The MFW function is not safety related. There was no loss of any credited safety function from structures, systems and components. Consequently, this event is considered to be of low safety significance.

4. Corrective Action

As a result of the Event Investigation Team (EIT) findings in response to the immediate issue of relay contact sensitivity, a relay's operation in the speed control circuit for the SGFW pumps was changed from an energized closed to an energized open configuration with the associated software changes. This reduces the HGA relay sensitivity to agitation and will avert additional SGFW pump trips. "Trip sensitive equipment" signs and barriers were added for the terminal box for this control relay.

Corrective actions that are related to this event, including lessons learned surrounding the considerations for use of digital interfacing, are being addressed in accordance with the Millstone Corrective Action Program.

5. Previous Occurrences

No previous similar events/conditions were identified.

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].